

## Patent Abstracts of Japan

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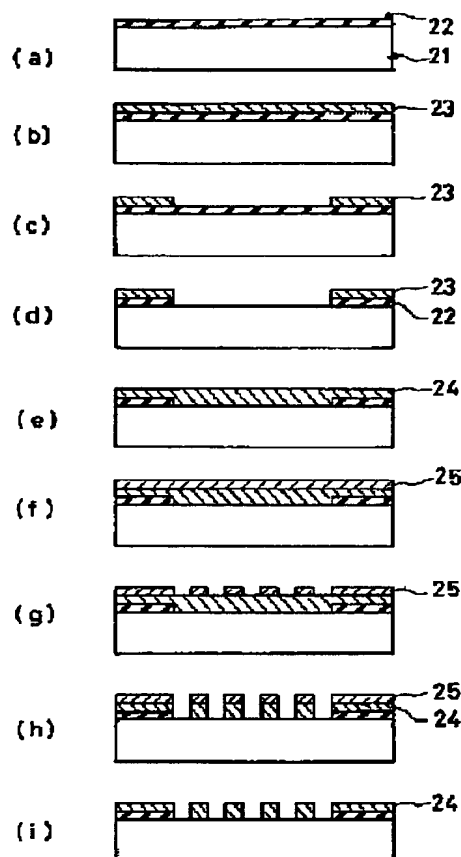
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APPLICANT : TOSHIBA CORP;

INVENTOR : TOKAWA IWAO;

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TITLE : PHASE SHIFT MASK



**ABSTRACT :** **PROBLEM TO BE SOLVED:** To form a halftone type phase shift mask in which peeling of a halftone film is not caused, by forming a halftone film in a light-shielding region on the surface of a Cr film.

**SOLUTION:** A metal Cr film 22 is formed by sputtering, for example to 100nm thickness on a quartz substrate 21. Then an electron beam resist is formed, for example, to 300nm thickness by spin coating. A desired pattern is drawn on the resist 23 by an electron beam drawing device and the resist is developed to form a resist pattern. The obtd. pattern is used as an etching mask to carry out wet etching of the metal Cr film 22 in an etching liquid essentially comprising cerium (II) ammonium nitrate. Then the resist 23 is peeled and the substrate is washed, on which a silicon nitride film 24 as a halftone film is formed by sputtering. Then the substrate is subjected to ultrasonic cleaning with ozone water and to brush cleaning. Thus, peeling of the halftone film can be prevented.

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